

Applicants respectfully traverse the Examiner's rejection. The present invention relates to a process for producing titanium powder from a source of titanium chloride vapor in which the vapor is submerged in liquid alkali metal or alkaline earth metal or mixtures to reduce the titanium tetrachloride to titanium powder. The Homme '017 patent does not remotely show or suggest the invention.

The present invention teaches that if the reducing metal is present as a continuous liquid phase and the halide gas is introduced below the surface of the liquid reducing metal, the thermodynamics of the reaction are substantially different than the thermodynamics of a reaction such as that disclosed in the Homme '017 patent. In the Homme '017 patent, alkali metal is introduced through inlet valves 25 and 26 and forms a layer of liquid at the bottom of chamber 1 as shown by the dashed line 33. Liquid titanium chloride is introduced through inlet 27 and vaporizes when it is introduced into the reaction chamber 1 thereby to provide a vapor titanium tetrachloride which interacts with the alkali metal only at the interface or surface of the liquid metal layer 33. The thermodynamics of a surface reaction such as disclosed in Homme '017 are entirely different than the thermodynamics of the reaction defined in the claims at issue.

In the claims at issue as in all the claims, the halide vapor is introduced within the liquid reducing metal, which is the continuous phase. The nature of the reaction therefore is controlled by the fact that the liquid reducing metal is the continuous phase, that is each molecule of the chloride or halide vapor is surrounded by continuous liquid phase. The result of this fundamental difference is enormous.

Using the subject invention, the applicants can produce a titanium powder which is friable and which is easily separated from the reaction products, unlike the methods

in all the prior art patents which, particularly in the case of titanium, where the reaction is highly exothermic, resulting in a product in the form of a sponge which has included therein a sintered material of a salt, the metal being formed, and unreacted reducing metal all in a compact which has to be separated, see the specification for discussion of the drawbacks of the Hunter and Kroll processes.

Accordingly, it is respectfully suggested that claims 9, 11, 13, 15, 16 and 17, all of which require the introduction of a vapor submerged into a liquid reducing metal is nowhere shown or suggested by the Homme '017 patent in which the titanium tetrachloride vapor is introduced at the top of the vessel and is not introduced into or submerged within a liquid metal continuum. It is submitted that claims 9, 11, 13, 15, 16 and 17 are drawn to patentable subject matter and the allowance thereof is requested.

Claims 9, 11 and 13-19 were rejected under 35 U.S.C. § 102(b) as being anticipated by the Worthington U.S. patent no. 4,445,931. The Worthington patent discloses a method of making of making titanium powder in which a vaporous metal halide is mixed with an atomized spray of molten sodium. The Worthington '931 patent shows a vapor reaction and does not show or suggest the invention claimed by the applicants. The previous discussion with respect to the continuous reducing metal phase and the introduction of a gaseous halide therein applies to this rejection and is nowhere remotely shown or suggested in the Worthington '931 patent. Accordingly, it is respectfully suggested that claims 9, 11 and 13-19 are not anticipated by the Worthington '931 patent and are patentable in view thereof.

Claims 1-7, 12, 14, 18 and 19 were rejected under 35 U.S.C. §103(a) as being unpatentable over the Homme '017 patent. The applicants traverse each conclusion

made by the Examiner in this rejection. The Examiner's statement in paragraph 6 bridging pages 3 and 4 of the Office Action and the conclusions drawn therefrom including that, the Homme disclosure is held to create a *prima facie* case of obviousness of the presently claimed invention" are entirely based on a misconception of the invention. There is not one iota of disclosure in any of the cited prior art including the Homme '017 patent, the Worthington '931 patent or the Evans '420 patent of introducing a halide vapor into a continuous phase of liquid reducing metal. Each of the claims rejected by the Examiner has such a requirement. The Examiner cannot show any teaching in any prior art reference that suggests the inventions claimed in claims 1-21, as presented. More specifically, the Homme '017 patent is entirely insufficient on which to reject claims 1-7, 12, 14, 18 and 19 under 35 U.S.C. §103(a). It is respectfully submitted that each of these claims is directed to patentable subject and the allowance thereof is requested.

Claims 1-7 and 12 were rejected under 35 U.S.C. §103(a) as being unpatentable over the Worthington '931 patent. The applicants traverse each conclusion made by the Examiner in this paragraph. The Worthington patent discloses the introduction of an atomized spray of sodium with a titanium tetrachloride vapor. The Worthington patent does not remotely show or suggest any aspect of the claimed invention. Accordingly, the Worthington '931 patent is entirely devoid of any teaching on which to base any rejection under §102 or §103 of Title 35. For the foregoing reasons, it is respectfully suggested that claims 1-7 and 12 are patentable within the meaning of §103 in view of the Worthington '931 patent.

Claim 8 was rejected under 35 U.S.C. §103(a) as being unpatentable over the Homme '017 patent and in view of the Worthington '931 patent and either which in view of the Evans U.S. patent no. 4,556,420. The applicants traverse each conclusion of the Examiner in this paragraph.

Claim 8 is dependent on claim 5 which contains the recitation of the introduction of the halide vapor into a continuum of the liquid alkali metal or alkali earth metal or mixtures thereof. No such teaching is remotely shown or suggested by any prior art reference. More particularly, the Evans '420 patent teaches a process in which the reducing metal is in one container and the halide diffuses thereinto from another container. Accordingly, there is no teaching of the invention in the Evans '420 patent. It is respectfully suggested that claim 8 is drawn to patentable subject matter and the allowance thereof is requested.

Claims 1-20 were rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-41 of U.S. patent no. 5,779,761 or over claims 1-40 of U.S. patent no. 5,958,106. A timely filed Terminal Disclaimer in compliance with 37 C.F.R. 1.321(c) is enclosed herewith.

All matters having been attended to, it is respectfully submitted that each of claims 1-21 as now presented is drawn to patentable subject matter and the allowance thereof is requested.

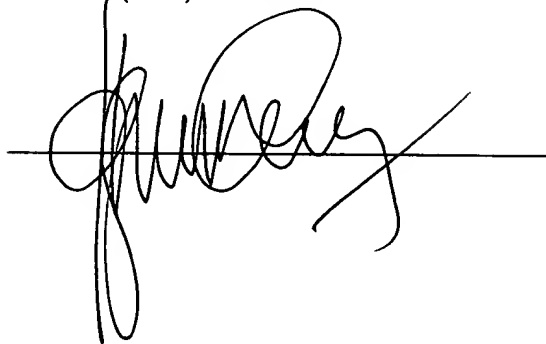
The Examiner is requested to note the proposed change to inventorship in the filing receipt, copy enclosed.

A substitute Declaration and Oath is enclosed.

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Respectfully submitted,

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A handwritten signature in black ink, appearing to read "Harry M. Levy", is written over a horizontal line. The signature is stylized with large loops and a long horizontal stroke at the end.